THE EFFECT OF PRE-EXERCISE DIETARY MANIPULATION ON ATP UTILISATION AND METABOLISM DURING SIMULATED DUATHLON TIME TRIAL PERFORMANCE

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Introduction: Duathlon is a multi-sport event that has received little attention in terms of dietary intervention studies but presents an ideal form of exercise in which the development of appropriate nutritional strategies might benefit performance. This study investigated the effect of high carbohydrate and high fat meals on the metabolic responses to simulated duathlon time trials. Methods: Nine male subjects of mean (SD) age 28.6 (5.9) y, body mass 76.8 (8.5) kg, height 1.80 (0.7) m, and VO₂max 4.8 (0.6) l.min⁻¹ completed three laboratory simulated duathlon time trials (5 km run, 30 km cycle, and 5 km run). Subjects fasted overnight before each duathlon and were randomly given isoenergetic meals (3998 ± 2.2kJ) 3.5 hours before the start of exercise. The meals consisted of predominantly low carbohydrate (LCHO: 50 g), high carbohydrate (CHO: 214.8 g) or a fasting (F) condition, in which subjects ate nothing. Respiratory gas analysis was used to calculate substrate oxidation rates (Frayn 1983) and ATP utilisation was calculated using standard stoichiometric calculations. Significant differences in all of the data between conditions and over time were identified using a General Linear Model ANOVA with Repeated Measures and significance was accepted at p< 0.05. Results: Time to complete the duathlon (101.9 ± 6.8, 101.0 ± 7.1, 102.4 ± 7.1 min for the F, CHO and LCHO respectively) was not significantly affected by the pre-exercise meals (p> 0.05). Total ATP utilisation (92.5 ± 7.7, 94.8 ± 5.3, 92.6 ± 9.2 mol.min⁻¹ for F, CHO and LCHO respectively) was also unaffected by the pre-exercise meals although there were significant changes in the rate of ATP use as a result of a change in exercise modality (p<0.01). Carbohydrate oxidation rate was significantly increased following CHO (p<0.05) and significantly reduced following LCHO meal (p>0.05). Conversely fat oxidation rate was suppressed (p< 0.05) as a consequence of the availability of carbohydrate following CHO. Conclusion: Despite changes in substrate availability and differences in the oxidation rates of both carbohydrate and fat, both duathlon performance and the rate at which ATP is utilised are not altered as a result of acute pre-exercise macronutrient manipulation.

References:

Keywords: Sports Nutrition, Carbohydrate Intake